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A Next-Generation "System Switcher" for Single Projector Applications

The Extron System 5 IP

With A/V increasing its prominence in the corporate and education markets, demand for feature-rich components is growing as fast as we can make the technology available. Typically, presenters are not intrigued by all the bells and whistles in A/V products unless they're user-friendly. For a presenter, combining all of the elements into one, easy-to-use system is a step in the right direction. After all, the presenter has more pressing issues to address than figuring out how to run complex A/V equipment.

This dilemma makes the Extron **System 5 IP** system switcher a sensible and timely choice for any single projector application. An upgrade to the popular **System 5cr Plus** system switcher, the System 5 IP has many enhancements that make it an all-in-one, economical solution for single projector A/V installations in classrooms, boardrooms, and conference rooms. This five input integrated A/V switcher is loaded with feature and performance, making it perfect for applications that require a flexible, full-featured product that installs quickly and is very easy to operate.

New Features

In response to customer feedback, we've incorporated significant enhancements into the System 5 IP. Along with additional configurable inputs and relays, the System 5 IP also features increased bandwidth, a more powerful built-in audio amplifier, front panel backlit input buttons, and compatibility with a wider selection of projectors and our own extensive line of control options and **IR Control Modules** (IRCMs). To top it off,

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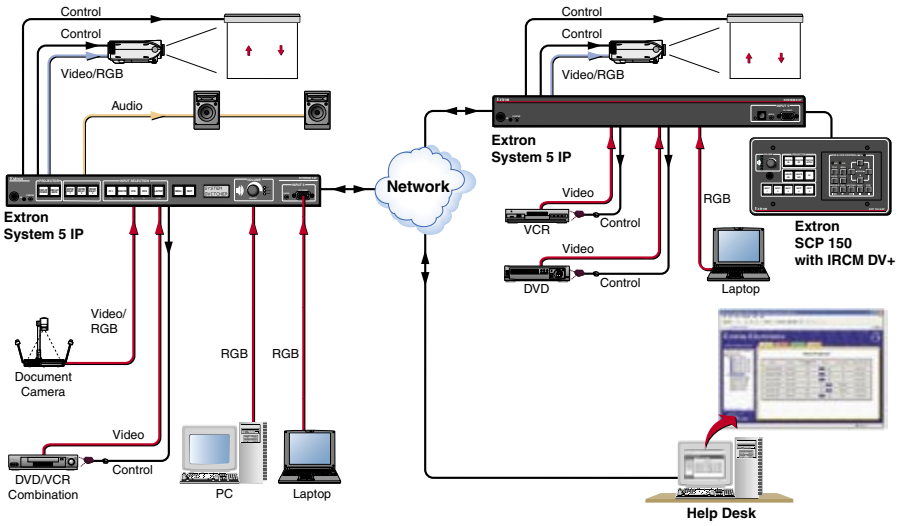
The System 5 IP: A Next-Generation System Switcher (cont.)



Two or more rooms with the System 5 IP can be monitored over a network via IP Link technology.

the System 5 IP is equipped with **IP Link**™, an IP integration technology developed by Extron to meet the needs of professional A/V environments.

Configurable Inputs

The System 5 IP includes two configurable inputs for composite video, S-video, and RGBHV. Two additional inputs are configurable for composite video or S-video on BNC and 4-pin mini DIN connectors. In addition, the System 5 IP has a front panel input for RGBHV on a 15-pin HD connector. This makes it convenient to directly plug into a laptop or document camera without accessing the back of the switcher.

With its configurable inputs, the System 5 IP enables users to mix and match a variety of video and computer sources in small classrooms or boardrooms. Regardless of the application, the System 5 IP offers the flexibility to switch between high resolution RGBHV/computer signals and standard definition (composite video, S-video) signals without sacrificing the integrity and flow of the presentation.

More Relays

The System 5 IP increases room control capability with six configurable internal relays. Now, instead of having to simultaneously control room lighting, window coverings, and display screens via one relay, the user has the flexibility to control each room device separately and at any time via the six relays.

The flexibility of multiple room control relays in a classroom or boardroom makes it possible for the presenter to stay focused on the presentation, without fretting about how to control the display screen or lighting.

Universal Projector Control

For more than 10 years, universal projector control has become synonymous with Extron system switchers. The System 5 IP continues this tradition by providing universal projector control via a dedicated, bi-directional RS-232 projector control port, as well as IR learning capabilities. Both features allow the switcher to operate with RS-232 and IR controllable displays. The switcher can learn IR signals from the remote control included with the display. From there, the switcher communicates between the display or projector and sources such as VCRs and DVD players. The System 5 IP is equipped with four IR/serial control ports, which are not only useful to control external sources, but a second projector or display as well.

Engineers at Extron create and administer a large selection of commonly used projector control drivers for a wide variety of projectors and displays. These drivers enable the System 5 IP to control common projector functions such as power and input selection. Users can create their own drivers or go to the Extron Web site (www.extron.com) to download drivers pre-configured for the latest and most popular projectors. This alone makes the System 5 IP an instant hit with schools and businesses where display devices are frequently replaced. In addition, the switcher features a custom configuration mode to allow for user-defined RS-232 or IR commands.

Audio

The System 5 IP also offers many audio feature enhancements. It includes two line level outputs (one fixed and one variable) for use with external recording or signal processing equipment. Also, the fixed outputs of the System 5 IP enable integrators to install a system that is compliant with ADA requirements, which specifies effective communication in presentation environments for people with hearing loss. The System 5 IP can be connected to an assistive listening device to meet these requirements. The switcher's variable audio outputs are adjusted by the front panel volume control or via remote control.

Another improvement is the System 5 IP's internal, 40-watt (2 x 20 watts rms) audio amplifier, which can drive 4 or 8 ohm speakers. The unit can be set for stereo or dual mono mode, in which it sums the left and right input signals together and drives the same mono signal to both the left and right outputs.

Control Options

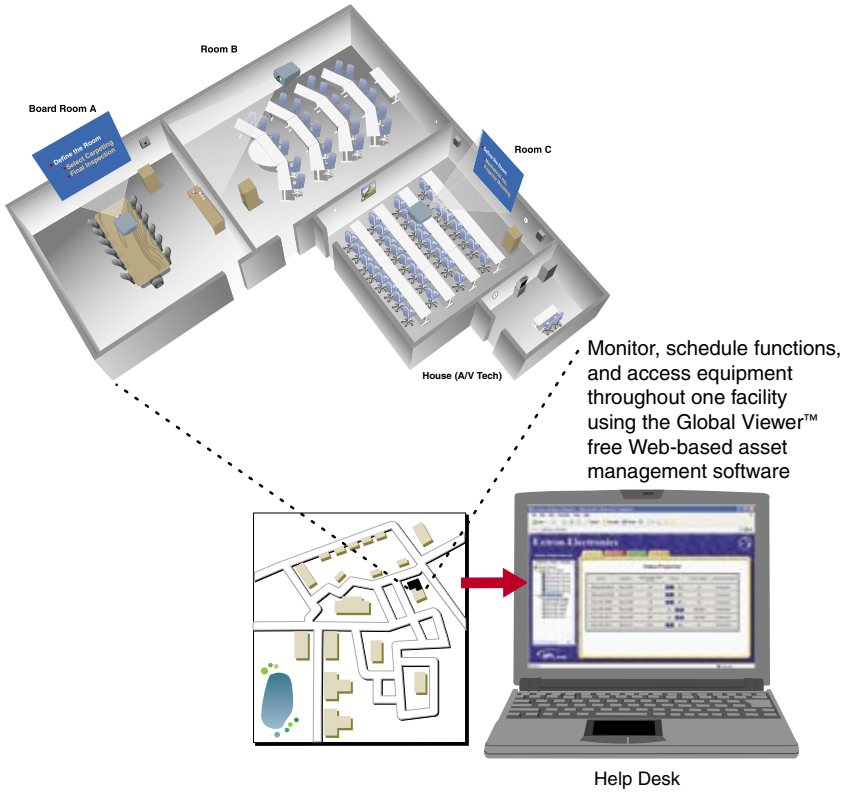
There are a number of control options available on the System 5 IP that help simplify the

Extron SCP 150 AAP shown with Extron IRCM-DV+ IR Control Module

switcher's overall functionality. Users can operate the System 5 IP by selecting the switcher's front panel backlit buttons, the optional **IR 402** remote control, or optional **SCP 150 Series** hardwired control pads. For installations that only rely on the switcher's remote control capabilities, the System 5 IP is offered without front panel controls, but still provides the front panel 15-pin HD input connector for RGBHV.

The optional IR 402 remote and SCP 150 control pad duplicate the System 5 IP's front panel functions and enable users to remotely control the switching, projection, and room functions. In addition to the SCP 150, the **SCP 150 AAP** includes openings for up to four single space Architectural Adapter Plates (AAPs) including IR Control Modules (IRCMs), for VCRs, DVD players, and tape decks.

Both the SCP 150 and SCP 150 AAP (shown at left) can be mounted in a wall, podium, or table, and are available in gray, black, or white to blend in with the environment.


Room B
Board Room A
Room C
House (A/V Tech)
Monitor, schedule functions, and access equipment throughout one facility using the Global Viewer™ free Web-based asset management software
Help Desk

Whichever way you choose to operate the System 5 IP, these options make it easy to customize an A/V system and address the needs of just about any small-scale application where simplicity is integral to optimum integration.

IP Link™ Technology

The System 5 IP includes an entirely new feature added to many of Extron's flagship products: IP Link. Utilizing Ethernet connectivity and an integrated Web server, the IP Link feature allows the System 5 IP to remotely monitor and manage most projector and A/V system functions from any computer with a standard Web browser. IP Link enables the System 5 IP to proactively manage and troubleshoot a system over high-speed local area networks (LANs), wide area networks (WANs), or the Internet. The included Web server can be customized for common functions such as I/O switching, system control, security, online diagnostics, and proactive monitoring through user-friendly graphical interfaces.

In one example, the IP Link feature of the System 5 IP gives the administrator of an educational facility the ability to access, monitor, and troubleshoot any device connected to any Sytem 5 IP from a single location. The Extron IP Link Global Viewer is a key asset management tool that allows the administrator to identify which A/V products are connected to the System 5 IP. Once the products are identified and configured, the administrator can view the entire A/V system on the network via any Web browser such as Microsoft® Internet Explorer or Netscape® Navigator. From there, the administrator is able to oversee all the connected products from the convenience of a single workstation.

The administrator can track the projector lamp hours in each classroom and generate an e-mail alert well before its maximum lifespan to avoid unexpected lamp failure. The alert sent by the System 5 IP is received by e-mail via a computer, cell phone, PDA, or pager. The administrator can then order and replace the new lamp before the existing one burns out.

IP Link includes a real-time clock that allows the administrator to program operating alerts, schedule routine equipment activity, or run maintenance checks on lamp hours, environmental conditions, connectivity, and other issues vital to operations. For instance, the administrator can configure the projectors to power on or off at pre-selected times, while each device is automatically monitored via its connection to the LAN. As a result, downtime is minimized because equipment is proactively serviced, the administrator knows the status of all devices at any time, and utility expenses are reduced.

A Great Switcher Made Better

When it was introduced, the System 5cr Plus was promoted as an all-inclusive solution for small-scale applications. With enhanced control features including IP Link monitoring, stronger audio amplifier, backlit input buttons, an intuitive LCD interface, and an inactivity timer, the System 5 IP has harnessed the power of the System 5cr Plus and expanded on its capabilities to create an easy-to-use, next-generation system switcher for today's sophisticated classrooms and boardrooms.

Kennesaw State University: Putting the Cart Before the Course

From its humble beginnings as a small railroad town and major battleground of the Civil War to the northwest Atlanta suburb of today, the city of Kennesaw thrives on tradition, community, prosperity, and education. Driving this last point home is Kennesaw State University (KSU), one of the fastest growing learning institutions in the United States. Opening in 1963 as a junior college, KSU is now Georgia's fourth largest state university, with almost 18,000 students and 55 undergraduate and graduate degree programs.

Kennesaw State University serves a diverse student body in Atlanta, GA. US News & World Report called the school one of the "rising stars of education."

Nine Electronic Classrooms

In its Guide to America's Best Colleges and Universities, US News & World Report called KSU one of the "rising stars of education." To maintain its distinction as an "up and comer," the school's administrators realized they had to harness technological advancements that many learning institutions are embracing. Dr. Randy C. Hinds, Chief Information Officer and Professor of Information Systems, and Karl C. Aldag, Director of Presentation Technology, explored new concepts regarding high tech tools and the school's classrooms. Aldag noted that KSU had outgrown the basic multimedia pushcart and simply didn't have the staff or resources to maintain and/or check equipment in and out. This led to the idea of an integrated multimedia system.

In the summer of 2003, Hinds, Aldag, and KSU's technology advisory committee decided to move forward with their plan for a functional electronic classroom. They envisioned a room with a desktop computer, and a way to plug in a laptop computer. They also wanted to tie in an A/V system that could be intuitively controlled without a separate remote. "We needed an integrated system that was easy to use and control," Aldag said.

The green light was given to KSU's in-house Presentation Technology Department (PTD) to turn the initiative into reality. Led by Charles Huberty, System Support Specialist II, the team spent two and a half weeks assembling nine multimedia carts for nine separate classrooms. The lower section of each cart includes two racks filled with several A/V components: a VCR, a DVD player, a CPU, an audio mixer, an auxiliary XLR microphone jack, and an Extron **System 7SC**, a seven input, dual output, multi-format switcher with a built-in video scaler.

The System 7SC Runs the Show

"The System 7SC was chosen for its scaling, switching, and projector control ability," Huberty said. The System 7SC has rightfully earned the distinction of being an all-purpose, single-projector hub that provides switching, scaling, and projector and room control. Its capacity to integrate these functions along with RGB and video capabilities makes the switcher that much easier to operate for the KSU faculty. The instructors can control many of the features of the System 7SC by simply pushing a button on the installed Extron **MLC 206 AAP MediaLink Controller**.

The dual outputs of the System 7SC is another unique feature that Kennesaw used to their advantage. An LCD computer monitor mounted on the cart is often used as a local monitor during a presentation. Aside from routine switching, the System 7SC's scaling feature is a big plus for the Kennesaw faculty, who tap into a variety of different signal types.

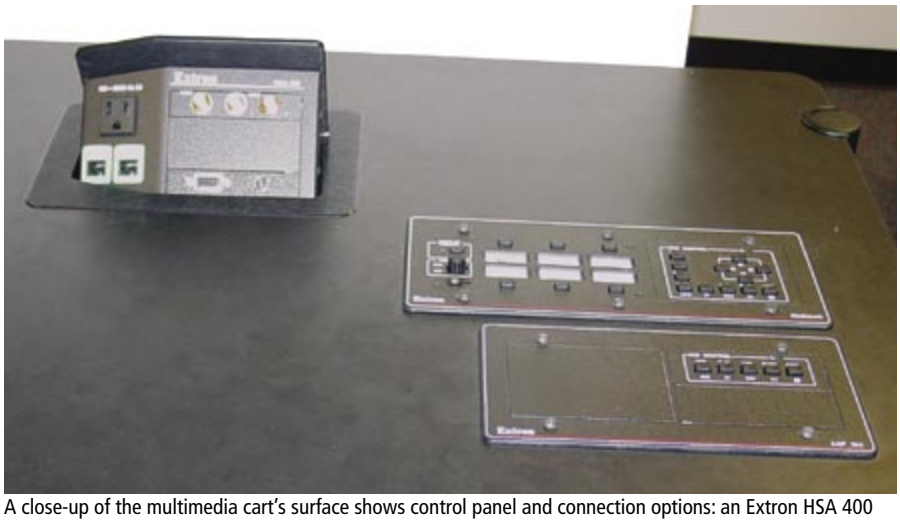
To scale any video input, the System 7SC incorporates several of Extron's proprietary technologies. This includes Dynamic Motion Interpolation (DMI™), an advanced motion

detection and compensation method that enables image enhancement with no loss of image fidelity; 3:2 and 2:2 pulldown detection, which maximizes image detail and sharpness for NTSC and PAL materials originating from film; and Accu-RATE Frame Lock (AFL™), which solves frame rate conversion issues.

Scratching the Surface

Even though the carts have been rendered immobile, Huberty explained that they were "the best solution at the time. We could get the most tabletop space out of them." Indeed, the surface area of the carts is the most intriguing aspect of the systems. To maximize the surface area, an LCD monitor for the computer is attached to a swinging arm which, in turn, is bolted to the front center portion of the cart's tabletop.

Holes were precut in the cart's surface to house a variety of Extron products including: the MLC 206 AAP, which fits into a five-gang wall plate and includes four single space Architectural Adapter Plate (AAP) openings for controlling all audio and video sources; an Extron **HSA 400 Hideaway Surface Access** enclosure that allows for inconspicuous computer-video interface connector access and control; and an Extron **AAP 104**, a four-gang size wall plate with openings for up to eight single space AAPs.



A close-up of the multimedia cart's surface shows control panel and connection options: an Extron HSA 400 Hideaway Surface Access enclosure, MLC 206 AAP MediaLink Controller, and AAP 104.

The PTD team took full advantage of the MLC 206, HSA 400, and AAP 104 by populating them with pass-through and control module AAPs. The HSA 400 includes two optional AAPs: to connect a laptop with another A/V source.

Regarding the 15-pin HD pass-through AAP, Huberty said: "Our faculty members carry laptops with them, so we want them to walk in, plug in, and go. We are also using document cameras with VGA outputs." He added that the RCA pass-through AAP is "for camcorders, a DV-cam, or a mini DV deck. If they come in with an old beta tape, we're prepared. And we also have some older document cameras that use composite." Huberty mentioned that the RJ-45s that come standard on the HSA 400 allow faculty members to plug in their laptops to access KSU's network.

The multimedia carts enable instructors to switch and execute a wide variety of computer-video, video, and audio signals. One KSU professor claims the carts have "completely changed the dynamics of teaching."

The multimedia cart's equipment rack includes an Extron System 7SC, with a VCR and DVD player.

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Kennesaw State University (cont.)

The MLC 206 and AAP 104 have each been outfitted with one IR Control Module (IRCM). The MLC 206 has an Extron IRCM-DVD+, which offers transport and menu controls for a DVD player. The AAP 104 has an Extron **IRCM-VCR**, which provides remote control of a VCR's basic features.

The MLC 206 controls five sources. In addition to the auxiliary VGA and auxiliary composite sources coming from the HSA 400, the desktop computer, VCR, and DVD player that are all mounted on the cart are controlled with the MLC 206. "The MLC 206 was chosen for the number of inputs it has, its ability to communicate with the System 7SC, the modules for DVD player and VCR control, and its relatively inexpensive price," Huberty said.

Making the Connection

Once the carts were assembled and loaded up with computer and A/V equipment, the PTD staff wired everything by hand. Huberty said that virtually no pre-manufactured cable was used, with the exception of two Extron VGA with Audio Cables that include 15-pin HD male connectors and audio cables with a 3.5 mm stereo mini jack on each end. These are primarily used to hook up the laptops.

While the carts were being wired, another crew was in each room pulling and terminating cables, hanging speakers and projection screens, and installing the multimedia XGA LCD video projector. "The only infrastructure requirements not solely handled by us were the electrical outlets, network jacks, and the replacement of chalkboards with LCS (Liquid Chalk System®) marker boards," said Huberty.

As for connecting the projector to the System 7SC, Extron **BNC-5 Mini HR Cable** was used. Lighter, smaller in diameter, and more convenient to install than standard coaxial cable, the Mini HR cable offers excellent video performance for carrying high resolution signals. Huberty stated that the length of the cable runs and termination varied from room to room. "In some of the rooms we ran the cable in the walls," he said. "But if the cart was moved to the middle of the room, which some of our faculty members asked for, we ran raceway molding on the floor so the cable could be fed to the cart without anyone tripping over it."

Changing the Dynamics of Teaching

Even with a limited time allotted to get the systems up and running, the PTD technicians encountered very few problems. "The biggest obstacle for this project was retrofitting," Huberty remarked. "Our job was to try and get all of the requested equipment in a space the faculty wanted and not have a noticeable degradation of quality, both in the image and in the instructor's presentations."

Largely because of the Extron products that were used, Kennesaw was able to get the most "bang for the buck." As for how the systems have been received, the university's faculty couldn't be more positive in their praise. "I love them!" exclaimed Dr. Gary Roberts, Professor of Management in the Management and Entrepreneurship department, who uses the system in his classroom on a daily basis. "They have completely changed the dynamics of teaching. In fact, I find it very difficult now to teach in a room without the range of equipment offered on our carts. It's like going back a century in time."

For more information on Kennesaw State University, visit them on the Web at http://www.kennesaw.edu/.

Each multimedia cart houses all of the classroom's A/V and IT equipment, including the Extron System 7SC system switcher.

by Jeff Gibson, Vice President of Sales

Online Applications Section Provides a New Design and Educational Resource

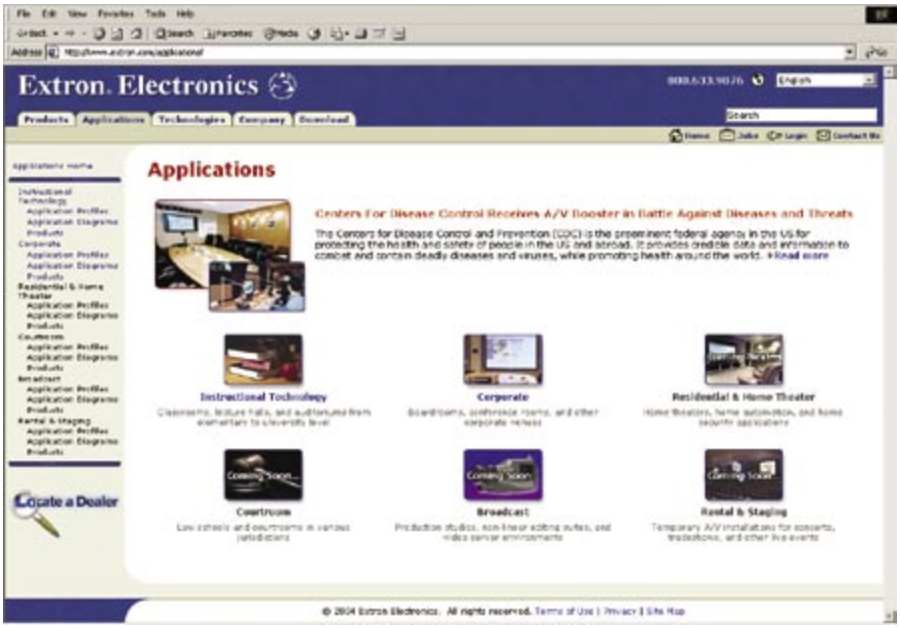
We're pleased to announce a new resource on the Extron Web site (www.extron.com) to assist you in your system integration design. The new Applications section is a compendium of real-world case studies, application diagrams, and selected products that demonstrate how Extron devices are used effectively in a variety of settings.

Many of these applications were created by our integrators, installers, and consultants from unique requirements. Education is one of our top priorities at Extron, and we want to share these success stories with you in the hope of guiding those who encounter comparable challenges.

The Applications section focuses on six environments:

- **Instructional Technology**— Classrooms, lecture halls, and auditoriums from K-12 through university levels
- **Corporate** — Boardrooms, conference rooms, and more
- **Residential & Home Theater** — Automation, security, and home theater
- **Courtroom** — Law schools and courtrooms
- **Broadcast** — Production studios, non-linear editing suites, and video server environments
- **Rental & Staging** — Concerts, tradeshows, and other live events

Within each application area, you'll find application profiles, diagrams, and products. Application profiles are in-depth, analytical case studies that spotlight dealers and/or consultants using Extron products. Application diagrams go one step further and explore system design options with several different clearly, easy-to-visualize illustrations. The Products section highlights Extron's products, based on their functionality and relevancy to a given environment. Altogether, these three links emphasize the importance of looking at system integration from every angle to ensure the best solution.



The new Applications section of the Extron Web site features case studies, diagrams, and products for several environments.

The Instructional Technology and Corporate sections are the first sections completed. In the months ahead, you'll see other helpful information added to the section. To find the Applications section, go to www.extron.com and look for the tabs underneath the Extron logo. Click on the Applications tab, and you're there.

Detailed diagrams provide potential solutions for a variety of applications.

IPL T SFI244 Ethernet Control Interface

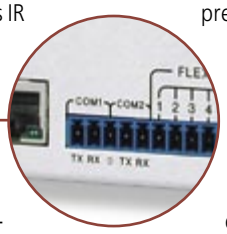
Latest IP Link™ Model Provides More A/V System Management Possibilities

The role of the technical administrator in todayís organizations has expanded to include A/V system asset management; increased responsibilities that can overwhelm available budgets and staffing. Increasingly, administrators are looking for ways to intelligently Web-enable their A/V equipment. Integrating A/V systems into an IP network helps organizations leverage limited resources and provides the same type of centralized remote asset management that IT managers enjoy for their systems.

IPL T SFI244

One of the biggest challenges in creating an intelligent asset management system is the wide variety of control signals required to make the system work. Professional A/V equipment routinely provides a serial (RS-232) interface, but communicating with everything in the room requires the ability to send and receive analog and digital signals and send IR commands. The **IPL T SFI244 Ethernet Control Interface** from Extron provides all of that, and more.

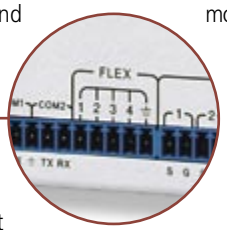
The IPL T SFI244 packs the same punch as its IP Link™ siblings with a built-in high performance Web server and full-blown Ethernet connectivity. Where it stands out from the rest is in the number and types of control signals it can manage. The IPL T SFI244 includes 10 control ports: two serial ports, four Flex I/O ports and four IR ports. It also boasts IR learning capability.



Serial Ports

The IPL T SFI 244 offers RS-232 connectivity on two captive screw ports for bi-directional communication of two independent serial devices.

When configured for pass-through mode, the interfaces can pass through commands from an existing control system and communicate with a single device.



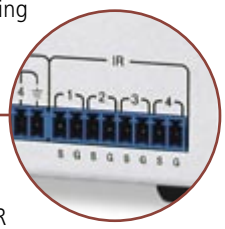
Flex I/O Ports

Four Flex I/O ports can support TTL and analog signals from 0 to 24 volts, allowing management of a wide variety of devices. The Flex I/O ports can be configured in three ways: analog in, digital in, or digital out.

Flex I/O ports can be configured to receive analog voltages for use with photo sensors, level feedback, strain gauges, thermocouples, variable potentiometers, and other devices. Incoming analog voltages from 0 to 24 volts are sampled with 12 bit precision. For example, a thermal sensor installed in an equipment rack can be connected to one of the Flex I/O inputs, and the IPL T SFI244 can be configured to send an e-mail message, if the rack temperature exceeds a specified threshold.

When configured as digital inputs, the Flex I/O ports can connect to switches, motion sensors, moisture sensors, and tally feedback. This provides the ability to receive status from a variety of devices, including projector lifts, motorized projection screens, room partition switches, and push buttons.

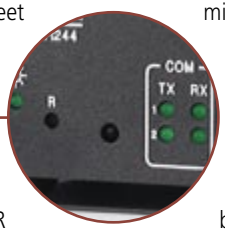
When configured as digital outputs, the Flex I/O ports can drive LEDs, 24 volt incandescent lamps, or other devices that accept a TTL input signal. For applications that require contact closure control, the Flex I/O ports can interface with an Extron IPA T RLY4, an IP Link Accessory featuring four isolated relays.



IR Ports

The IPL T SFI244 includes four fully programmable IR ports. Each IR port can output IR signals with or without the carrier signal using a wired IR emitter or through an IR broadcaster. IR control data

can be collected and stored in two ways: IR data file download and IR learning. Extron maintains a vast library of IR data files that can be downloaded from our Web site for storage in the IPL T SFI244. Each unit will power four IR emitters, each up to 400 feet (120 m) in length.



IR Learning

In addition, the IPL T SFI244 can learn IR commands for virtually any IR controllable device. IR learning is a simple and easy process using the IR remote that is provided with the device to be controlled. Specific serial command strings can also be associated with specific IR commands.

Centralized Management and Remote Monitoring

The IPL T SFI244 works with the **Extron Global Viewer™**, a free Web based asset management application that gives administrators the ability to access, monitor, and troubleshoot all of an organization's A/V equipment from a single location. The administrator can view the entire A/V system via any Web browser such as Microsoft® Internet Explorer or Netscape® Navigator. From there, the administrator can oversee all rooms simultaneously from the convenience of a single workstation.

In one example, a school's IT administrator can track the activity and status of the projectors installed in the school's classrooms. Each projector's power, connections, lamp life, and temperature, can be viewed. The administrator can even turn off all the projectors at once. The IPL T SFI244 can be configured to generate an e-mail alert to the maintenance department at, for example, 1,350 lamp hours, well before the life maximum of 1,500 hours. The e-mail alert can be received by a computer, cell phone, PDA, or pager. The maintenance department can then order and replace the new lamp before the existing one burns out.

IP Link technology includes a real-time clock that allows the administrator to program operating alerts, schedule routine equipment activity, or run maintenance checks on lamp hours, environmental conditions, connectivity, and other issues vital to operations. For instance, the administrator may want to configure the projectors to power on or off at pre-selected times, while each device is automatically monitored via its connection to the LAN. As a result, downtime is minimized because equipment is proactively serviced, the administrator knows the status of all devices at any time, and utility expenses are reduced.

IP Link Technology

The IPL T SFI244, like each IP Link Ethernet control interface, is a small, high performance, auto-sensing, auto-networking Web server with robust computing power. The IP Link internal processor has a latency, or delay, from the time it receives data to the time it responds, of less than one millisecond, meaning Web pages are served many times faster than similar products. Each IP Link interface features 1.25 MB of onboard flash memory for Global Viewer Web pages and device drivers. The IP Link operating system supports standard Internet protocols such as DHCP for dynamic IP addressing, SMTP for sending e-mail, and many others, ensuring full functionality on existing IP networks.

With IP Link technology and the Global Viewer software, the IPL T SFI244 goes beyond the traditional approach to A/V system management, enabling system administrators to centrally monitor multiple rooms simultaneously, proactively manage large quantities of equipment, and intuitively automate routine tasks and events.

Additional Features of the IPL T SFI244:

- **Multi-user support**

  Multiple simultaneous connections enable each IP Link device to support many concurrent users and improve system throughput by sending information in parallel.

- **Two levels of security with password protection**

  User access level authorizes limited entry to only pre-designated functions, while administrator access level permits full access to advanced settings.

- **Real-time clock**

  Programmable operating alerts, sequencing, and automatic monitoring with the internal real-time clock and calendar allow the IPL T SFI244 to routinely check the status of a device.

- **Intuitive configuration utility**

  A supplied Windows® based configuration utility makes product setup simple and easy. Drivers for a wide variety of projectors and Extron A/V products can be downloaded from the Extron Web site (www.extron.com).

- **Power options**

  For added reliability, users can power up the IPL T SFI244 two different ways. With power over LAN (IEEE 802.3af), there is no need for a local power supply. The included external, international power supply can also be used for worldwide power compatibility.

- **Versatile mounting options**

  The IPL T SFI244 comes in a 1U, quarter rack width metal enclosure and is rack, under-desk, and projector-mountable.

by Steve Somers, Vice President of Engineering

The Mysterious Loudness Control What Does It Do?

The first really decent stereo audio system I owned had a pushbutton on the front panel called "loudness." I pushed it. I decided the audio sounded better so I left it pushed in; never changed it. OK, occasionally I would push it to the off position; nope, sounded better on. Thinking back, I really didn't care what it was for. I left it pushed ON because it made the system sound better, so I continued to concentrate on my video career. All the while, my stereo system "sounded good."

Fast-forward 30 years. Here I am writing about that pushbutton. That pushbutton recently created considerable flurry here at Extron. Since the inclusion of much more audio support in our products, that loudness pushbutton finally crept into a prototype product. Someone in Product Management pushed it, but it didn't do what it was supposed to do: make the system "sound good." That launched an investigation into the real intent of the loudness control function and a bit of re-evaluation by those individuals designing audio products.

We learned something. Different people and different companies have different design philosophies toward functionality of the loudness control. So, when you push it, what should the loudness control do? Let's begin answering that question with a look at the historical basis for the loudness control and why it should make an audio system "sound good."

Equal Loudness for All

Research characterizing the human hearing range generated an areal map of auditory response as shown in **Figure 1**. The shape of the minimum audibility curve tells us something about the frequency response of the ear at low sound pressure levels. At the boundary of minimum audibility, perception of low frequencies and high frequencies requires a significant level boost as compared to the mid-range frequencies. Conversely, at the upper boundary the threshold of feeling represents a much flatter response. The incomplete outline of the graph indicates regions of extreme variability where performance data collected on human subjects is not altogether consistent.

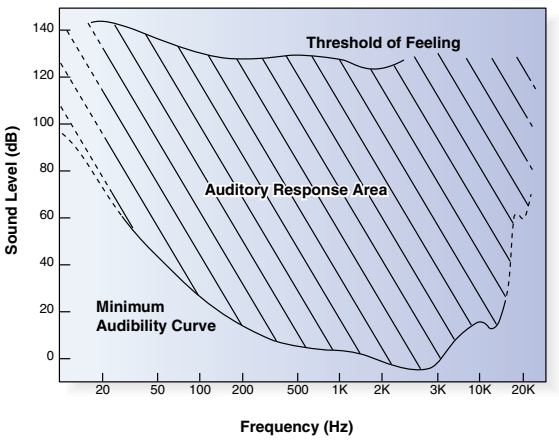


Figure 1: Realm of human auditory response

In the 1930s, two Bell Labs researchers, Harvey Fletcher and Wilden Munson, organized a research project in which they asked that each participant match the perceived level of two pure tones by adjusting the level of one tone source against a 1000 Hz tone at a pre-determined reference level, until the two tones were perceived as equal in loudness. Their test results embodied data at many frequencies at various sound pressure levels across the human hearing range. Since this is a highly subjective way to conduct research, many subjects performed the experiment. Results were averaged to obtain loudness contours intended to represent a "normal" response. Their results, called the Fletcher-Munson equal loudness contours, provide significant insight toward our understanding of how humans perceive relative sound levels. In 1956, D.W. Robinson and R.S. Dadson refined this work in a similar study described as having more reliable measurement results. The Robinson and Dadson equal loudness contours shown in **Figure 2** are most widely used today, but are often referred to as the Fletcher-Munson curves. Eventually, the International Standards Organization adopted the Robinson-Dadson curves as a basis for "Normal Equal-Loudness Level Contours," ISO 226:1987, which is now the current standard. Since these curves describe the perception of only pure tones in a free field, they do not necessarily apply to noise band analysis or diffused random noise.[1] Additional research continues in an attempt to further characterize our hearing perceptions in real audio applications.

If we invert any of these contour curves at a particular intensity level, we now have the relative frequency response plot of the human ear for all tones across the frequency range on that particular contour. Inversion of the lower curves illustrates human ear frequency response deficiencies at low sound intensities. Conversely, invert any of the upper, higher intensity curves to realize a more

flattened frequency response. Fletcher and Munson found human hearing response consistently deficient at low sound intensities, for both low frequencies and higher frequencies compared to the 1000 Hz reference point used to establish these curves. But, the ear is particularly sensitive in the range of about 300 to 6000 Hz. This happens to be the frequency range that includes the sound of most human speech patterns and, curiously, the pitch of a crying baby. For average background sound pressure levels, the rolled-off response at lower sound pressures allows us to more easily listen and understand human speech in the presence of low or high frequency noise.

Meet the Phons

Each contour is identified as a level in "phons." A phon is a subjective unit for loudness equal to the sound pressure level in decibels when compared to an equally loud standard note. The standard note is a 1000 Hz pure tone or narrowband noise centered at 1000 Hz.[2] Note that the level in phons matches the sound pressure level in decibels only at the 1000 Hz standard reference point on the graph. Therefore, the 40 phon contour represents a 40dB SPL at 1000 Hz, but a different SPL at most other frequencies. Essentially, each phon contour represents a 10dB step that we perceive as about twice as loud as the previous level. This may be a bit confusing, since we know that a measured 3dB increase represents a doubling of sound power, but only a perceptible increase in volume to the ear. The red dashed line at the bottom of Figure 2 describes the minimum audible level for hearing sensitivity in a free field.

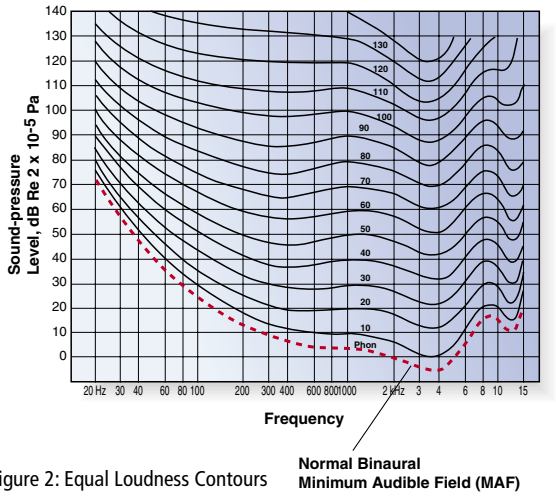


Figure 2: Equal Loudness Contours

The effect of applying these curves suggests that some form of filtering is required within measurement equipment if we wish to synthesize the normal hearing performance of the ear when calibrating systems or making value judgments as to sound quality. Most often, the sound pressure level (SPL) meter is used to setup listening levels for an audio system. The SPL meter includes selectable filters that modify its calibration so it approximates the ear's response at a given range of sound pressure levels. The most often-used filter settings are the A-weighted and C-weighted. What are these and how do they relate to our hearing response?

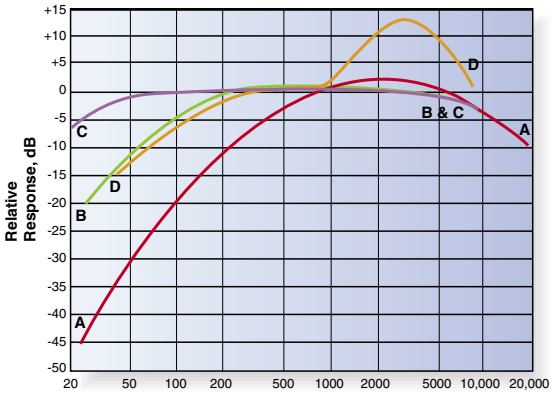


Figure 3: Weighting filter response curves used in sound level meters

The concept of weighting refers to the relative shaping of the filter's response so as to mimic the ear at a given loudness level. Four weighted filter functions, A, B, C, and D, are used to simplify and apply regions of the loudness contours that are most meaningful for describing the frequency response of the human ear toward real world applications. Refer to **Figure 3** for the following discussion. A-weighting defines the shape of the filter (and the human ear response) at low sound pressure levels, namely the 40 phon loudness contour curve. Sound level measurements in decibels relating to A-weighting are denoted with the units – dB(A). Shaping for this curve means that low frequencies are attenuated and the speech frequencies are amplified within the measuring equipment. B-weighting describes an intermediate level approximating the 70 phon curve. Notice how the ear's response begins to flatten. C-weighting utilizes the 100 phon curve, which describes the nearly flat response of the ear for high levels. The C-weighting response is most useful for typical home theater listening levels and for evaluating system performance for flat response characteristics. The D-weighting Curve is a special case developed for aircraft fly-over noise testing, which penalizes high frequencies.[3] Likewise, sound level measurements in decibels relative to these weighting curves are recorded as dB(B), dB(C), and dB(D), respectively. The A and C weightings are most often used since the former relates to normal everyday sound pressure levels and the latter relates to higher listening levels where the ear's response is nearly flat.

Sounding Good

We've covered some significant background, but how does all of that relate to the loudness control feature on an audio system? Understanding how the ear perceives sound intensity versus frequency leads us directly to that loudness feature. The loudness control is simply intended to significantly boost low and high frequencies when listening at low levels so that the ear perceives an overall flatter sound pressure level. In other words, if the loudness contouring control is not enabled at low volume levels, bass and treble appear to be lacking. This effect corresponds to the recently described A-weighted condition where

continued on page 12

low and high frequencies require additional amplification so the audio "sounds good."

Since the ear's frequency response is relatively flat at high sound levels, the compensating effect of the loudness contouring control is not required. The loudness feature is a kind of equalizing function that, ideally, should adjust itself to have greater compensation effect at low sound pressure levels and less effect as sound pressure increases.

From **Figure 4**, you can see that the amount of power needed (green shaded area bounded by L_A curve) to compensate for low frequencies is significant. For this reason, in home theater audio system design, it is not uncommon to use fairly large, separate amplification just for the low frequency channel. The shaded area within the high frequency range indicates relative compensation required for this portion of the spectrum when at a lower volume level. At high loudness levels, where the ear's response is nearly flat, compensation requirements decrease to nearly zero as shown by the L_C curve.

Loudness Made Too Simple

The issue is whether the implementation of the loudness control feature merely boosts lows and highs using one fixed setting as some simplistic designs might do; or is it dynamic and capable of modifying the amount of equalization depending on the setting of the volume control?

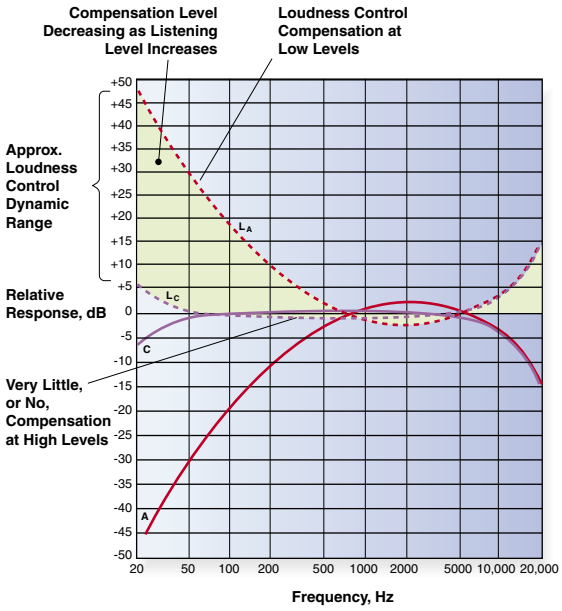


Figure 4: Loudness function compensation range

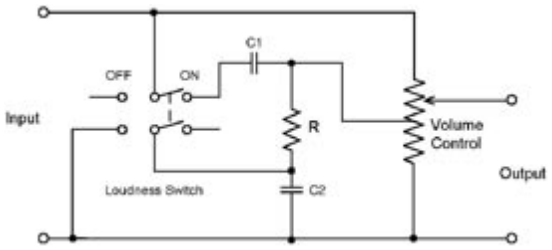


Figure 5: Simple analog loudness circuit example

Historically, most loudness controls were analog implementations using discrete resistors, capacitors, and even inductors intended to approximate the compensation curve (curve L_A in Figure 4) for the A-weighting function. Most were designed around the volume control. **Figure 5** illustrates one simple approach using a volume control incorporating a fourth tap located about halfway through rotation. Resistor-capacitor networks, when switched into the volume control circuit, provided amplitude compensation. For really low cost circuits, only the low end frequencies may have been boosted. Or, perhaps the midrange was "cut" to make it sound more like the level of the low end. Certainly, analog implementations of the loudness feature vary widely. Full compensation for the A-weighted response requires a relatively complex compensation network.

The basic approach with the circuit in Figure 5 is: 1) use C1 to boost high frequencies where it is connected across the top half of the volume control when the loudness switch is ON; 2) select the value of C2 so its reactance is lower at high and mid frequencies, and; 3) select R so that high and mid frequencies are attenuated; but, as frequency decreases, the reactance of C2 will rise and reduce attenuation of low frequencies. This is a simple, low-cost design built totally around performance trade offs.

DSP: Just Made for Loudness

Modern implementations of loudness equalization circuits fall comfortably into the realm of digital signal processing, or DSP. Within the vast possibilities afforded by digital processing, the creation of filters capable of replicating a near-exact compensating response is not only possible, but generally straightforward. DSP-based algorithms allow for continuously adaptable functions that will compensate in real time as sound pressure level is varied over its normal excursion.

High speed digital signal processing, in all its forms, provides the means for the best implementation of loudness compensation contouring in today's sophisticated audio systems. With tools like this, engineers must return and study the fundamental knowledge base developed by researchers like Fletcher and Munson; et al. Taking a fresh look at "what once was" will ensure us the best shot at developing digital-based products that perform to the closest approximation of the original concept. But, no matter what, all that you and I really care about is that when we push that loudness button, the system "sounds good."

References

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2. Weik, M. H., Communications Standard Dictionary, 1997, Chapman & Hall

3. Lord, H., Gatley, W., Evensen, H., Noise Control for Engineers, Robert Krieger Publishing, 1987

4. Ballou, Glen M., Handbook for Sound Engineers, Third edition, 2002, Butterworth-Heinemann, Chapter 2, Psychoacoustics, F. Alton Everest

ExtroNews publishes information about new products that are relative to the Extron product line in the New News section. If you would like a new product to be reviewed for New News, please send a press release, literature, contact name, and a color slide or photo to: **New News c/o Lee Dodson, Extron Electronics, 1230 South Lewis Street, Anaheim, CA 92805, phone: (714) 491-1500, ext. 6394, or send e-mail to extronews@extron.com.**

WIREMOLD

www.wiremold.com

The Wiremold Company has introduced the first flush poke-thru device that supports audio-video connectivity from Extron. The Walker® AV3 Series poke-thru device provides open space power and data/communications connections — and now A/V connectivity — in new and renovated buildings, it accepts a wide variety of Extron MAAPs (mini architectural adapter plates) for video, audio, control, voice, and data connectors, as well as active modules such as VGA line drivers, audio buffers, and twisted pair transmitters. For pricing on the Walker AV3 Series, contact Wiremold at 800.621.0049.

SONY

www.sony.com/projectors

Sony introduces the QUALIA-004, a full digital high definition home theater projector with 1500 ANSI Lumens. The QUALIA-004 is powered by Sony's proprietary SXRD™ technology and features a 1080P (1920x1080) native panel resolution and a contrast ratio of 2000:1. The QUALIA-004 also features a pure Xenon lamp, a unique Optical Engine, and Cinema Black Pro technology. The projector includes HDMI and DVI-D as well as component, S-video, and composite video connections. It has a suggested USD list price of $25,000.

SAMSUNG

www.samsung.com

Samsung presents the SP-H700A Home Theater HD2 DLP Projector, which accurately reproduces the color fidelity specified by the Society of Motion Picture and Television Engineers for High Definition. With 700 ANSI Lumens, 720p (1280 x 720) resolution, and a contrast ratio of 2000:1, the SP-H700A features DVI-HDTV compatibility with an HDCP interface for a pure digital connection and Samsung's proprietary DNIe™ engine for enhanced detail, color, and noise reduction. It has a suggested USD list price of $10,000.

SHARP

www.sharpelectronics.com

Sharp unveils the LC-M3700, a 37-inch flat panel LCD Monitor. Featuring widescreen high definition resolution, true 16 x 9 aspect ratio, and 1366 x 768 native resolution, the LC-M3700 is ideal for digital signage and public information applications. The slim, lightweight monitor delivers an 800:1 contrast ratio on its non-glare screen. The LC-M3700's backlight has a 60,000 hour life. The LC-M3700 features a replaceable backlight, which extends the unit's life indefinitely. It has a suggested USD list price of $7,995.

MITSUBISHI

www.mitsubishi.com

The Mitsubishi XL5950 ColorView is an LCD projector equipped with a built-in motion-sensitive anti-theft alarm feature. The alarm, is designed to deter projector theft from unattended classrooms, meeting rooms, or other easy-access settings. The XL5900 offers 4700 ANSI Lumens, a contrast ratio of 600:1, and an XGA (1024 x 768) native resolution. This compact projector also includes Mitsubishi's own Picture-in-Picture feature, which provides a simultaneous live feed from a computer and a video source. It has a suggested USD list price of $11,995.

HITACHI

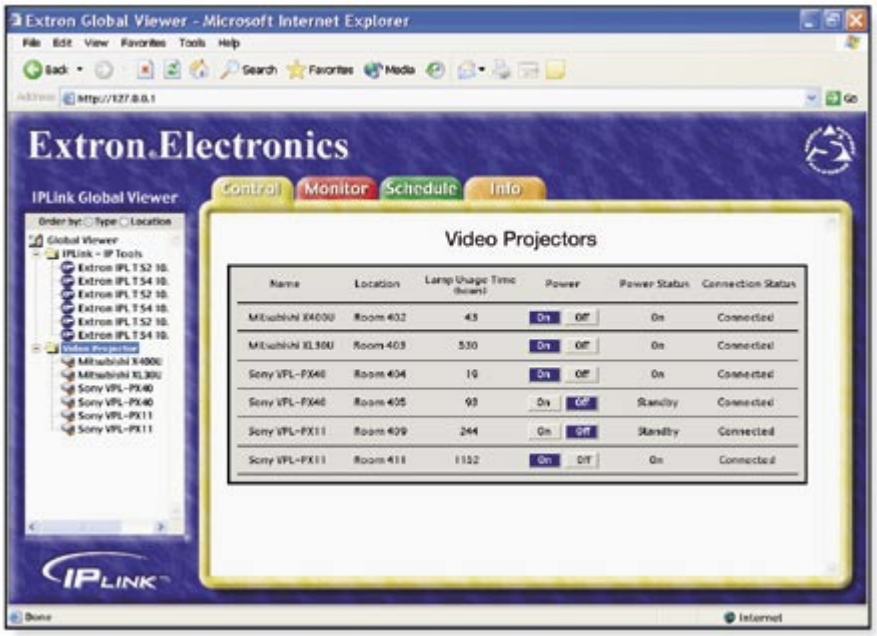
www.hitachi.com

The Hitachi CMP5000WXU plasma display features a sleek design with a large 50-inch viewing area. Ideal for conference and show rooms, restaurant menu boards, retail stores, and sports venues, the 16:9 display is less than four inches thick, allowing for a space-efficient installation. The CMP5000WXU has a 900:1 contrast ratio, a native XGA resolution (1024 x 768), and sophisticated color filters for excellent visual impact. An optional video card enables composite and DVI-D inputs and HDTV-compatibility. It has a suggested USD list price of $15,995.

By David Libman, Director of Software Product Development

It's All About The Network

The merging of IT and AV control opens new possibilities for centralizing, extending, and automating system management. However, incorporating Ethernet functionality into A/V means more than simply adding the right connectors. What's needed is a solution designed specifically for managing professional A/V systems over an IP network. Extron's IP Link™ technology incorporates the very best qualities of IP networking: distributed processing, support for IP protocols, and easy scalability. IP Link Web-based monitoring, scheduling, and control fully extends the power and benefits of IP networking to A/V system management.



The IP Link Global Viewer™ is the Web-based asset managment application supplied with IP Link™ enabled products.

IP Link: Distributed, Open, and Scalable

It's the distributed nature of IP networks that makes them reliable and resilient. The distribution of processing power throughout the network is inherent in the design of IP Link technology. As a result, the failure of any single IP Link interface on the network has little or no impact on the entire system. In addition, the use of non-proprietary IP protocols, or sets of rules, ensures that IP Link interfaces will function on any existing IP-based network. Distributed processors and support for open protocols make IP Link highly scalable. Increasing the number of monitoring and control points is as simple as adding one or more IP Link interfaces anywhere on the network.

The IP Link family of products was designed from the ground up to enhance the applications important to A/V personnel, facilities managers, and IT managers.

Hardware: At its core, each IP Link Ethernet network interface is a small, high performance Web server with robust computing power. Each one contains a very fast processor, with a latency, or delay, of less than one millisecond from the time it receives a command to the time it acts on that command. As a result, Web pages are served many times faster than similar products, so data is refreshed at a consistently high speed. IP Link fully supports IP networking capabilities, meaning messages and commands are automatically rerouted and retransmitted whenever necessary.

Each IP Link interface has 1.25 MB of flash memory available to users to store the Global Viewer asset management application along with any other user customized Web pages.

IP Link also supports the IEEE 802.3af Power over Ethernet (POE) protocol. POE delivers power to network devices over the data cable, in accordance with the IEEE standard. PoE capability gives system designers greater freedom in locating IP Link interfaces.

Every element of IP Link's hardware design supports integration into an existing network infrastructure, including the configuration of the connectors and the front-side location of the diagnostic LEDs.

Software: The IP Link operating system supports standard Internet protocols like DHCP for dynamic IP addressing, SMTP for sending e-mail, and many others, ensuring full functionality on existing IP networks.

The operating system supports the open source/open architecture philosophy of Web-based languages like HTML, XML, and JavaScript. This open architecture makes A/V systems accessible via a wide array of control points, including laptops, desktops, handhelds, and even Web-enabled cell phones. All that's needed is a Web browser and access to the network.

What's So Good About a Distributed Architecture?

The distinct advantages of IP Link's distributed architecture include fault tolerance, a high level of performance, minimal impact on network traffic, and system scalability.

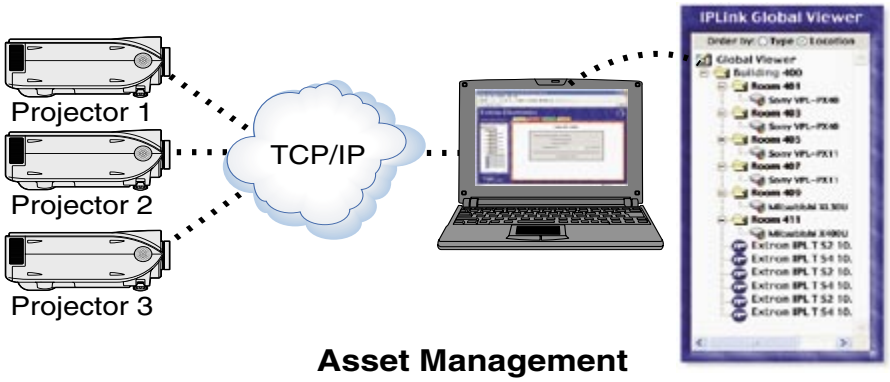
Fault-Tolerance: Unlike a system that employs a centralized processor with many control ports, IP Link systems use many distributed processors with control ports on each one. The resilience in the IP Link design is essential in reducing the effect a partial network failure might have on the service and support of the managed resources. Part of the network may fail, but by design, the rest of the management system will not be affected.

High Performance: Each IP Link interface operates as an independent control processor, so commands to and from multiple IP Link interfaces can be sent and received simultaneously. Our distributed architecture and high speed processors combine to eliminate bottlenecks. In fact, each additional IP Link interface added to the system constitutes additional processing power, in effect increasing overall system performance.

Minimal Network Traffic: Impact on network traffic is minimal no matter how many IP Link Ethernet control interfaces are used on the network. Processing occurs inside the IP Link interfaces and control commands are sent locally to the connected A/V devices. IP Link interfaces only speak when spoken to. As long as control Web pages are developed using the best practices outlined in the users manuals, network traffic generated by them will be very light.

Scalability: As an organization grows, it's critical that the A/V monitoring system keep up with the addition of new presentation rooms and equipment. Centralized processors are often limited in the number of control ports that can be added, and instead, they have to be replaced with larger and more expensive processors as systems grow. IP Link Ethernet control interfaces are available in a wide array of device configurations, offering serial ports, Flex I/O ports, and IR capabilities.

The core technology of IP Link makes it ideal for implementing A/V system management over the most widely available transport medium today, the corporate IP network. In my next article, I'll describe how Global Viewer software leverages IP Link's technology for powerful Web-based asset management and remote monitoring.



The IP Link Global Viewer provides views of connected devices organized by room or device type.

IP Link™ Global Viewer™

The Extron IP Link™ Global Viewer™ is the Web-based asset management and remote monitoring application developed for use with IP Link Ethernet network interfaces. The Global Viewer is provided for free and there are no licensing fees and no per-seat charges, no matter how many users.

The benefits of using IP Link technology with Global Viewer for monitoring and control of A/V systems are numerous:

- Device setup and configuration of automated tasks is simple and doesn't require any specialized programming skills.
- Remote, browser-based A/V system monitoring and management from multiple control points (e.g., computer, PDA, or cell phone) from virtually anywhere in the world.
- Instant e-mail notification of device tampering, pre-scheduled events, and maintenance reminders.
- Reduced device ownership costs and more efficient use of labor resources.

Global Viewer provides an easy-to-operate method for monitoring and controlling an organization's entire A/V system, including projectors, cameras, audio/video playback equipment, lighting controllers, screen controllers, and more. Delivering real-time status information through a single intuitive interface, the Global Viewer enables IT and A/V system administrators to be more productive, and greatly simplifies the management of heterogeneous A/V system environments.

NEW

HSA 222C & HSA 222S

Fixed Configuration, Tilt-Up Hideaway Surface Access Enclosures with Power and Data Connections

HSA 222C

USA, Universal Female IEC, Central Europe, United Kingdom, Australia, and Switzerland outlets

The Extron **Hideaway HSA 222 Series** features elegant tabletop mountable metal enclosures that provide easy access to data and power connections. We've recently introduced two models: the HSA 222C and the HSA 222S. All models offer a fixed configuration of two RJ-45 (CAT 6) network/data/phone connectors and two unswitched AC power outlets.

The HSA 222C enclosures feature a circular bezel with US power outlets, while the HSA 222S models feature a square bezel and the option of choosing US, Central European, UK, Swiss, or Australian power outlets. To access the connectors, users simply press down on the top of the enclosure, releasing a mechanical latch. The HSA pivots open, presenting the connectors at an ergonomic 49° angle to the tabletop. All models in the HSA 222 Series are available in either a black anodized or brushed aluminum finish.

HSA 222C

Part Number	List Price*
HSA 222C (black)	
60-631-01	$795.00
HSA 222C (brushed aluminum)	
60-631-03	$950.00

HSA 222S

Part Number	List Price*
HSA 222S (black)	
60-630-01	$750.00
HSA 222S (brushed aluminum)	
60-630-03	$890.00
HSA 222S EU (black)	
60-630-21	$750.00
HSA 222S EU (brushed aluminum)	
60-630-23	$890.00
HSA 222S SWISS (black)	
60-630-31	$750.00
HSA 222S SWISS (brushed aluminum)	
60-630-33	$890.00
HSA 222S UK (black)	
60-630-41	$750.00
HSA 222S UK (brushed aluminum)	
60-630-43	$890.00
HSA 222S AUS (black)	
60-630-61	$750.00
HSA 222S AUS (brushed aluminum)	
60-630-63	$890.00

*Prices listed in US Dollars, valid for US sales only.

URL
http://www.extron.com/hideawayhsa222c
http://www.extron.com/hideawayhsa222s

NEW

MTP T 15HD RS & MTP R 15HD RS

Mini Twisted Pair Transceivers for RGBHV and RS-232

MTP R 15HD RS

The Extron **MTP T 15HD RS Transmitter** and **MTP R 15HD RS Receiver** work together to create a cost-effective and high performance system for sending high resolution RGBHV and RS-232 signals long distances over a single CAT 5, 5e, or 6 unshielded twisted pair (UTP) cable. XGA signals can be sent up to 600 feet / 185 meters while UXGA signals (1600x1200) can be sent up to 450 feet / 135 meters.

The MTP T 15HD RS and MTP R 15HD RS precisely optimize image quality for various UTP cable lengths using adjustment controls on both the transmitter and receiver. The receiver offers continuously variable gain and peaking controls, allowing users to dial in the exact amount of gain and peaking required for each unique cable run.

The MTP 15HD RS and MTP R 15HD RS are compatible with resolutions up to 1600 x 1200 (UXGA) and are ideal for such applications as large training facilities, museums, airports, movie theaters, and hotels. These products are well suited for any application that requires a cost-effective solution for sending RGBHV, RGBS, HDTV, and other high resolution video and bi-directional RS-232 signals long distances over UTP cable.

MTP T 15HD RS

Part Number	List Price*
60-652-01	$395.00

MTP R 15HD RS

Part Number	List Price*
60-653-01	$430.00

*Prices listed in US Dollars, valid for US sales only.

URL
www.extron.com/mtpt15hdrs

NEW

IPL T CR48

Four Contact Input and Eight Relay Port IP Link™ Ethernet Control Interface

IPL T CR48

Equipped with IP Link technology, the Extron **IPL T CR48** is a compact Ethernet control interface with integral Web server. The IPL T CR48 controls screens, timers, lights, motion sensors, and more. Four contact inputs (TTL only) and eight normally open relays offer the ability to control a wide variety of products in an A/V presentation environment.

IPA T IPA

Part Number	List Price*
60-544-05	$595.00

*Prices listed in US Dollars, valid for US sales only.

URL
www.extron.com/ipltcr48

NEW

MLM-WB+

Lockable Metal Wall Box with Flip-Down 4U Rack Space

MLM-WB+

The Extron **MLM-WB+** is a metal wall box with a flip-down 4U rack space to hold a VCR, DVD player, MediaLink Switcher, System 5 IP switcher, or other rack-mountable A/V equipment. The flip-down shelf includes an enclosure where the A/V equipment can be horizontally mounted while a laptop or other small, external device can be placed on top. When the shelf is flipped up, the A/V equipment is stored safely and securely out of the way. The MLM-WB+ features a 2U rack space opening at the top that will accept a variety of full rack width mounting plates, including the Extron MLM-RAAP. The MLM-WB+ is available in black or white.

MLM-WB+

Part Number	List Price*
MLM-WB+ (Black)	
60-458-02	$1,210.00
MLM-WB+ (White)	
60-458-03	$1,210.00

*Prices listed in US Dollars, valid for US sales only.

URL
www.extron.com/mlmwbplus

NEW

SMB

Surface Mount Boxes

SMB Five-gang box
with MLC 206 AAP installed

The Extron **SMB Surface Mount Boxes** are designed for the external mounting of many Extron architectural products including the MLC 206, MLC 206 AAP, SCP 150, SCP 150 AAP, as well as many Architectural Adapter Plate (AAP) and Mini-Architectural Adapter Plate (MAAP) mounting frames. The SMBs can be placed on a tabletop, workstation, or any other flat surface; they can also be mounted onto brick or cinder block walls or any wall with a depth too shallow for a gang box. The back and bottom of the boxes feature AAP openings for additional connector options. Blank AAP panels are included to fill unused openings. These rugged metal boxes are offered in seven different sizes and are available in a black anodized finish.

SWB – Surface Mount Boxes

Part Number	List Price*
SMB One-gang box (black)	
60-639-02	$155.00
SMB Two-gang box (black)	
60-640-02	$170.00
SMB Three-gang box (black)	
60-641-02	$185.00
SMB Four-gang box (black)	
60-642-02	$200.00
SMB Five-gang box (black)	
60-643-02	$215.00
SMB Six-gang box (black)	
60-644-02	$230.00
SMB Seven-gang box (black)	
60-645-02	$245.00

*Prices listed in US Dollars, valid for US sales only.

URL
www.extron.com/smb

System 5 IP System Switcher Configuration

A Quick Guide to Setting Up the Flexible New System 5 IP

Before its first use, an Extron System 5 IP System Switcher must be configured to interact with the multitude of presentation displays, A/V sources, and room devices that are designed into classrooms and conference rooms. Once configured, the System 5 IP puts the capability to monitor, schedule, and remotely control these devices into one box. In addition, the System 5 IP and connected A/V devices can be remotely managed from anywhere via the Internet. We refer to this capability as **asset management**. In this Tech Corner, we will show how easy it is to place the System 5 IP on the network, use the System 5 IP Configuration Program, and gain the ability to remotely manage the elements in an installation.

IP and MAC Addresses

First, we need to "hang" the switcher on the network. Each IP Link™ product from Extron has a unique Medium Access Control (MAC) address that is printed next to the serial number on the product. This address, along with an Internet Protocol (IP) address assigned by the system administrator of the network, will allow you to set up and configure the switcher.

"ARP-PING"

Once you have an IP address, and you have connected the switcher to an Ethernet jack, we need to tell the switcher its "name" (IP address). We do this by using the Address Resolution Protocol (ARP) and Packet Internet Grouper (PING) commands from the DOS Command Line applet. Think of it as ARP-PING. First, the ARP command will assign the IP address to the MAC address. The syntax of the ARP command is as follows: arp(space)-s(space)IP address(space)MAC address (enter). We can break down the ARP command as shown:

arp –s = Command
10.1.2.246 = IP address you wish to assign to the System 5 IP
00-05-a6-00-20-ce = Hardware MAC address

Second, the PING command is a utility that tests network connections. It is used here to set the IP address in the switcher. The PING command is simply: ping(space)IP address

ping = Command
10.1.2.246 = The IP address we just assigned to the switcher

NOTE: The ARP command only works if the System 5 IP unit is at its default address.

After you "ping" the switcher, you should see the ping statistics showing that the command was successful and the time it took to communicate with the device.

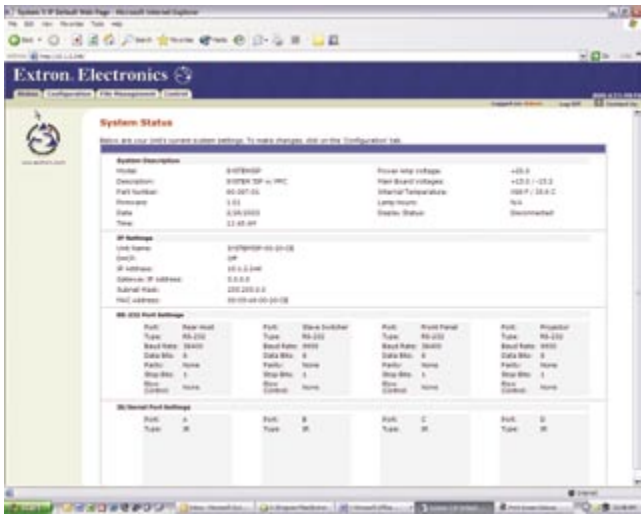


Figure 1. One of the embedded Web pages on the System 5 IP.

Looking Under the Hood

At this point, you can close the DOS Command Prompt, open up your browser and type in the newly assigned IP address of the switcher. Here you can "look inside" the System 5 IP by viewing its embedded Web page. (See **Figure 1.**)

Four tabs labeled Status, Configuration, File Management, and Control can be selected to view or change the settings of the switcher. The Control tab is where you may remotely operate the System 5 IP in real time. Service calls and help desk functions just got a lot easier, and you only unpacked the switcher a few minutes ago.

System 5 IP Configuration Program

Many aspects of the System 5 IP can be programmed via the embedded Web pages. However, full configuration is accomplished via Extron's free configuration software. This package can be downloaded from our Web site, www.extron.com. (From the home page, click on the Download tab, then search by product name.) After downloading and installing the software, launch Extron's System 5 IP Configuration Program from the icon on your computer's desktop. You will be asked how you would like to communicate with the switcher and to specify its IP address. Click "IP (LAN)" and type in the IP address in the IP address box. The program opens to the User Mode screen.

Configuring the System 5 IP

Going through a few of the software set-up screens demonstrates how quickly the System 5 IP can be configured to meet the needs of a simple, single projector installation. Let's walk through the set-up process by configuring the switcher to work with a Sharp PG-C45S Projector. Configuring the System 5 IP to control a projector is fast and easy. (See **Figure 2.**)

Under the **RS232/IR Config.** Tab, click or select the following operations:

1. Click the "Projector Port" button.
2. Under "Output Port Configuration," select "RS 232."
3. Under "Serial Selection," select "Use default in driver."
4. Under "Driver Category," select "Video Projector."
5. Under "Device Models," select "Sharp PG-C45S."
6. Click the "Add Port/Device Definition" button.

Configure the Projector Buttons

Now, we will associate the Power: On and Power: Off functions of the Sharp PG-C45S's driver to the front panel buttons on the System 5 IP. (See **Figure 3.**)

From the **Button Config.** tab, click the "Projector ON" button. A sub-menu appears:

1. In the "Type of Operation," select "Driver Operations."
2. Under "When," enter a check in the "Press" box.
3. Under "Port and Device Models Available," select "Proj Cont [232]: Sharp PG-C45S."
4. Under "Function Name," select "Power: On."

When you click the "Take Button Config." button, the configuration is set and a green circle is placed on the "Projector ON" button. To configure the "Projector OFF" button, follow the instructions above, but under "Function Name," select "Power: Off" in place of "Power: On."

We can continue in the same manner to configure the software until we have loaded all the drivers for any connected A/V devices and configured the associated buttons and switcher operations. Additional control panels such as the Extron SCP150 can be added and configured to remotely operate the switcher. To round out the System 5 IP's capabilities, IR control modules such as the Extron IRCM-DV+, which provides a remote control point for a DVD and VCR, are configured in the Button Config. tab. Once the configuration is complete, clicking the "Build & Apply Configuration" button will store the settings into configuration files and upload the files into the System 5 IP.

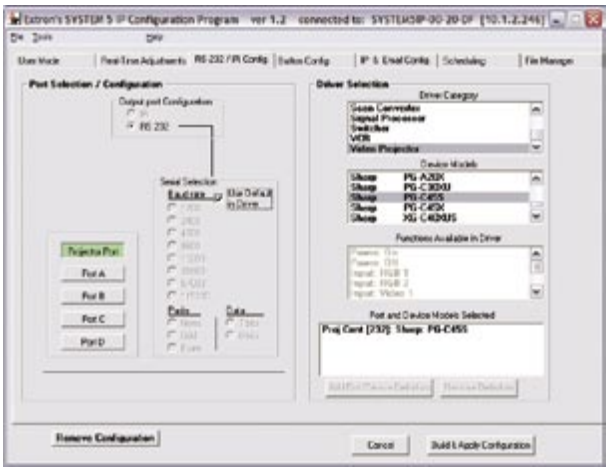


Figure 2. Configuring the switcher to work with the projector.

Figure 3. Configuring the projector buttons.

Back to the Network

Remember the embedded Web page of the System 5 IP? Go back to your browser and enter the IP address of the switcher, and you will see your fully configured System 5 IP and the advantage IP Link offers: Every action taken by the switcher is shown on the Web page. Projector lamp hours can be monitored from the Status tab. You can also monitor the projector's connection to the switcher. In both of these examples, the System 5 IP can send an e-mail to you or the local A/V administrator of a pending lamp expiration or a missing projector. Imagine the time and money saved by making a service call by remotely viewing the System 5 IP embedded Web pages versus making a visit to the installation site.

Asset Management

The need to troubleshoot an installation from miles away is critical in the competitive A/V market. In addition, integrators are looking for ways to stay involved with their customers after the installation is completed. The asset management capabilities built into IP Link is just one element that makes the Extron System 5 IP so powerful. The local control of all the elements of a presentation environment is another key advantage. Although the switcher may require configuration when installed, the power unleashed through the ability to provide remote and local control as well as asset management far outweigh the time spent in configuration. This is the premise all future A/V systems will be built upon — asset management over IP will provide customer support and cost savings.

As you can see, the System 5 IP with its Configuration Software is not only easy to set up but is a flexible platform for your A/V designs. The switcher is a highly capable centerpiece of any single projector installation design, and now with IP Link, the System 5 IP provides a system interface that is accessible from anywhere.

Lingonberry Collector

Tweeker Use #69

Fredrik Widmark, an A/V technician for Impact Europe AB of Umeå, Sweden, has found an ingenious way to utilize the world-famous Extron Tweeker. Every fall, Fredrik ventures into the woods to gather lingonberries. However, picking the berries is a bit tricky, especially when it comes to separating them from the twigs and leaves. So, Fredrik built a small box and placed a dozen Tweekers inside, creating an even row. Altogether, the Tweekers function as a harvesting mechanism that collects the berries by extricating them from the twigs and leaves. According to Fredrik, his invention works like a charm. "It makes it easier and faster to pick the berries up," he says.

Send us a photograph and brief explanation of how you use the Tweeker.
If we publish it in a future issue of ExtroNews, we'll give you a free **VTG 300**.

Please send entries along with contact information to:
Extron Tweeker Contest, 1230 South Lewis St., Anaheim, CA 92805.
Or e-mail a high-resolution photo and explanation to tweeker@extron.com

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